

Remarks

The Office Action mailed December 1, 2005 has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 1-20 are now pending in this application. Claims 1-20 are rejected. Claims 1, 8, and 15 have been amended. No new matter has been added.

The rejection of Claims 1, 2, 5, 6, 8, 9, 11, 12, 14, 15, 17, and 19 under 35 U.S.C. § 102(b) as being anticipated by Patsfall (U.S. Patent No. 4,883,216) is respectfully traversed.

Patsfall describes a method for repairing an airfoil (20). The repair method requires the airfoil (20) to be severed along a cut line (24) such that a damaged portion of the airfoil (20) is removed and an airfoil stub (26) is formed. Patsfall recites at column 3 lines 16-20 that “[w]hen the airfoil or projection 20 has a hollow portion, which frequently is the case with air cooled or weight reduced airfoils, cut line 24 is located in the solid portion 30 of the airfoil, radially inwardly from hollow portion 32.” During repair, a collar (44) including a pair of collar members (46 and 48) is positioned around the stub (26). Specifically, collar members (46 and 48) are each positioned on opposite sides of the stub (26) such that collar (44) surrounds stub (26). A replacement airfoil (64) extending from a replacement airfoil (64) is then bonded to the stub (26) and to collar (44) to form a replacement member (62).

Claim 1 recites a method for replacing a portion of a gas turbine engine rotor blade, the rotor blade having an original blade contour defined by a blade first sidewall and a blade second sidewall, the method comprising “cutting through the rotor blade such that a cut line extends from a leading edge of the blade to a trailing edge of the blade, and between the first sidewall and the second sidewall and such that the cut line extends at least partially through a hollow portion of the blade defined between the first and second sidewalls . . . coupling a replacement blade portion to remaining blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour that is one of an improvement in an aerodynamic performance over the original blade contour and substantially mirroring the original blade contour.”

Patsfall does not describe or suggest a method for replacing a portion of a gas turbine engine damaged rotor blade as recited in Claim 1. Specifically, Patsfall does not describe or suggest cutting through the rotor blade such that a cut line extends **from a leading edge of the blade to a trailing edge** of the blade, and at least partially **through a hollow portion of the blade** defined between the first and second sidewalls. Rather, in contrast to the invention, Patsfall describes at column 3 lines 16-20 that “[w]hen the airfoil or projection 20 has a hollow portion, which frequently is the case with air cooled or weight reduced airfoils, **cut line 24 is located in the solid portion 30 of the airfoil**, radially inwardly from hollow portion 32.” (emphasis added). Moreover, Patsfall does not describe nor suggest coupling a replacement blade portion to remaining blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour that substantially mirrors the original blade contour. Rather, in contrast to the present invention, Patsfall describes bonding a replacement airfoil to a stub of the original blade that is surrounded by a pair of collars. As such, the replacement blade created does not have a contour that substantially mirrors the original blade contour. For the reasons set forth above, Claim 1 is submitted to be patentable over Patsfall.

Claims 2, 5, and 6 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2, 5, and 6 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 2, 5, and 6 likewise are patentable over Patsfall.

Claim 8 recites a method for replacing a portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having a contour defined by the first sidewall and the second sidewall, the method comprising “cutting through the rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall and such that the cut line extends at least partially through a cooling cavity defined within the blade . . . contouring the replacement blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour.

Patsfall does not describe or suggest a method for replacing a portion of a gas turbine engine rotor blade as recited in Claim 8. Specifically, Patsfall does not

describe or suggest cutting through the rotor blade with a cut line that extends from the leading edge to the trailing edge, and at least partially through a cooling cavity defined within the blade. Rather, in contrast to the invention, Patsfall describes at column 3 lines 16-20 that “[w]hen the airfoil or projection 20 has a hollow portion, which frequently is the case with air cooled or weight reduced airfoils, **cut line 24 is located in the solid portion 30 of the airfoil**, radially inwardly from hollow portion 32.” (emphasis added). For the reasons set forth above, Claim 8 is submitted to be patentable over Patsfall.

Claims 9, 11, 12, and 14 depend from independent Claim 8. When the recitations of Claims 9, 11, 12, and 14 are considered in combination with the recitations of Claim 8, Applicants submit that Claims 9, 11, 12, and 14 likewise are patentable over Patsfall.

Claim 15 recites a method for replacing a damaged portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having an original compressor rotor blade contour defined by the first sidewall and the second sidewall, the method comprising “cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall, and such that the cut line extends at least partially through a cooling cavity defined between the first and second sidewalls . . . contouring the replacement blade portion such that the newly formed compressor rotor blade has a contour that substantially mirrors that of the original compressor rotor blade contour.

Patsfall does not describe or suggest a method for replacing a damaged portion of a gas turbine engine damaged rotor blade as recited in Claim 15. Specifically, Patsfall does not describe or suggest cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall, and such that the cut line extends at least partially through a cooling cavity defined between the first and second sidewalls. Rather, in contrast to the invention, Patsfall describes at column 3 lines 16-20 that “[w]hen the airfoil or projection 20 has a hollow portion, which frequently is the case with air cooled or weight reduced airfoils, **cut line 24 is located in the solid portion 30 of the airfoil**, radially inwardly from hollow portion 32.” (emphasis

added). Moreover, Patsfall does not describe nor suggest contouring the replacement blade portion such that the newly formed compressor rotor blade has a contour that substantially mirrors that of the original compressor rotor blade contour. Rather, in contrast to the present invention, Patsfall describes bonding a replacement airfoil to a stub of the original blade that is surrounded by a pair of collars. As such, the replacement blade created does not have a contour that substantially mirrors the original blade contour. For the reasons set forth above, Claim 15 is submitted to be patentable over Patsfall.

Claims 17 and 19 depend from independent Claim 15. When the recitations of Claims 17 and 19 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 17 and 19 likewise are patentable over Patsfall.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1, 2, 5, 6, 8, 9, 11, 12, 14, 15, 17, and 19 be withdrawn.

The rejection of Claims 1-3, 7, 8, 13, 15, 18, and 20 under 35 U.S.C. § 102(b) as being anticipated by Dulaney et al. (U.S. Patent No. 6,238,187) is respectfully traversed.

Dulaney et al. describe a method for repairing damage to an airfoil (10). More specifically, Dulaney et al. recite at column 1, lines 8-10 that the “present invention relates generally to a processing method for repairing a solid body, such as an airfoil from a gas turbine engine. . . .” The repair method includes removing those selected portions or sections (12 and 16) of the airfoil (10) which contain damage, and replacing those portions with replacement pieces (44 and 46). Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10.” Moreover, at column 8, lines 12-16, Dulaney et al. recite that “[i]t is preferable to mill away the damaged area rather than utilizing a single cut to remove the damaged area. Using a single cut may create vibrations which could alter the remaining airfoil, such as altering the airfoils dimensional tolerances.” At column 12, lines 16-28, Dulaney et al. describe the shortfalls of using welding operations and specify that “the present

invention incorporates a laser shock peening” to bond the replacement portion within the airfoil.

Claim 1 recites a method for replacing a portion of a gas turbine engine rotor blade, the rotor blade having an original blade contour defined by a blade first sidewall and a blade second sidewall, the method comprising “cutting through the rotor blade such that a cut line extends from a leading edge of the blade to a trailing edge of the blade, and between the first sidewall and the second sidewall and such that the cut line extends at least partially through a hollow portion of the blade defined between the first and second sidewalls . . . coupling a replacement blade portion to remaining blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour that is one of an improvement in an aerodynamic performance over the original blade contour and substantially mirroring the original blade contour.”

Dulaney et al. do not describe or suggest a method for replacing a portion of a gas turbine engine damaged rotor blade as recited in Claim 1. Specifically, Dulaney et al. do not describe or suggest cutting through the rotor blade such that **a cut line extends from a leading edge of the blade to a trailing edge** of the blade, and at least partially **through a hollow portion of the blade** defined between the first and second sidewalls. Rather, in contrast to the invention, Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10.” Moreover, Dulaney et al. recite at column 1, lines 8-10 that the “present invention relates generally to a processing method for repairing a solid body, such as an airfoil from a gas turbine engine. . . .” For the reasons set forth above, Claim 1 is submitted to be patentable over Dulaney et al.

Claims 2, 3 and 7 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2, 3 and 7 are considered in combination with the recitations of Claim 1, Applicants submit that Claims 2, 3 and 7 likewise are patentable over Dulaney et al.

Claim 8 recites a method for replacing a portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having a contour defined by the first sidewall and the second sidewall, the method comprising “cutting through the rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall and such that the cut line extends at least partially through a cooling cavity defined within the blade . . . contouring the replacement blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour.

Dulaney et al. do not describe or suggest a method for replacing a portion of a gas turbine engine rotor blade as recited in Claim 8. Specifically, Dulaney et al. do not describe or suggest cutting through the rotor blade with a cut line that extends from the leading edge to the trailing edge, and at least partially through a cooling cavity defined within the blade. Rather, in contrast to the invention, Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10.” Moreover, Dulaney et al. recite at column 1, lines 8-10 that the “present invention relates generally to a processing method for repairing a solid body, such as an airfoil from a gas turbine engine. . . .” For the reasons set forth above, Claim 8 is submitted to be patentable over Dulaney et al.

Claim 13 depends from independent Claim 8. When the recitations of Claim 13 are considered in combination with the recitations of Claim 8, Applicants submit that Claim 13 likewise is patentable over Dulaney et al.

Claim 15 recites a method for replacing a damaged portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having an original compressor rotor blade contour defined by the first sidewall and the second sidewall, the method comprising “cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the

second sidewall, and such that the cut line extends at least partially through a cooling cavity defined between the first and second sidewalls . . . contouring the replacement blade portion such that the newly formed compressor rotor blade has a contour that substantially mirrors that of the original compressor rotor blade contour.

Dulaney et al. do not describe or suggest a method for replacing a damaged portion of a gas turbine engine damaged rotor blade as recited in Claim 15. Specifically, Dulaney et al. do not describe or suggest cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall, and such that the cut line extends at least partially through a cooling cavity defined between the first and second sidewalls. Rather, in contrast to the invention, Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10.” Moreover, Dulaney et al. recite at column 1, lines 8-10 that the “present invention relates generally to a processing method for repairing a solid body, such as an airfoil from a gas turbine engine. . . .” For the reasons set forth above, Claim 15 is submitted to be patentable over Dulaney et al.

Claims 18 and 20 depend from independent Claim 15. When the recitations of Claims 18 and 20 are considered in combination with the recitations of Claim 15, Applicants submit that Claims 18 and 20 likewise are patentable over Dulaney et al.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 1-3, 7, 8, 13, 15, 18, and 20 be withdrawn.

The rejection of Claims 4, 10, and 16 under 35 U.S.C. § 103(a) as being unpatentable over Dulaney et al. in view of Legros (U.S. Patent 5,512,058) is respectfully traversed.

Dulaney et al. is described above. Legros describes a method for use in repairing turbine blades (12 and 13). The method includes removing a rotor, including the blades, from a turbine, determining an aligned position of the turbine blades relative to the rotor, and aligning a plurality of blades to the desired aligned

position prior to any repair step requiring cutting, machining or welding of the blades. As such, each blade is repaired in its correct position relative to the rotor.

Claim 4 depends indirectly on independent Claim 1 which recites a method for replacing a portion of a gas turbine engine rotor blade, the rotor blade having an original blade contour defined by a blade first sidewall and a blade second sidewall, the method comprising “cutting through the rotor blade such that a cut line extends from a leading edge of the blade to a trailing edge of the blade, and between the first sidewall and the second sidewall and such that the cut line extends at least partially through a hollow portion of the blade defined between the first and second sidewalls . . . coupling a replacement blade portion to remaining blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour that is one of an improvement in an aerodynamic performance over the original blade contour and substantially mirroring the original blade contour.”

Neither Dulaney et al. nor Legros, considered alone or in combination, describe or suggest a method for replacing a portion of a gas turbine engine damaged rotor blade as recited in Claim 1. Specifically, neither Dulaney et al. nor Legros, considered alone or in combination, describe or suggest a cutting through the rotor blade such that **a cut line extends from a leading edge of the blade to a trailing edge** of the blade, and at least partially **through a hollow portion of the blade** defined between the first and second sidewalls. Rather, in contrast to the invention, Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10,” and Legros describes removing the rotor from the engine such that the blades may all be aligned relative to the rotor before any repairs to the blades are preformed. For the reasons set forth above, Claim 1 is submitted to be patentable over Dulaney et al. in view of Legros.

When the recitations of Claim 4 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 4 likewise is patentable over Dulaney et al. in view of Legros.

Claim 10 depends indirectly on independent Claim 8 which recites a method for replacing a portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having a contour defined by the first sidewall and the second sidewall, the method comprising “cutting through the rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall and such that the cut line extends at least partially through a cooling cavity defined within the blade . . . contouring the replacement blade portion such that a newly formed rotor blade is formed with a predetermined aerodynamic contour.

Neither Dulaney et al. nor Legros, considered alone or in combination, describe or suggest a method for replacing a portion of a gas turbine engine rotor blade as recited in Claim 8. Specifically, neither Dulaney et al. nor Legros, considered alone or in combination, describe or suggest cutting through the rotor blade with a cut line that extends from the leading edge to the trailing edge, and at least partially through a cooling cavity defined within the blade. Rather, in contrast to the invention, Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10,” and Legros describes removing the rotor from the engine such that the blades may all be aligned relative to the rotor before any repairs to the blades are preformed. For the reasons set forth above, Claim 8 is submitted to be patentable over Dulaney et al. in view of Legros.

When the recitations of Claim 10 are considered in combination with the recitations of Claim 8, Applicants submit that dependent Claim 10 likewise is patentable over Dulaney et al. in view of Legros.

Claim 16 depends from independent Claim 15 which recites a method for replacing a damaged portion of a gas turbine engine rotor blade, the rotor blade including a leading edge, a trailing edge, a first sidewall, and a second sidewall, and having an original compressor rotor blade contour defined by the first sidewall and the second sidewall, the method comprising “cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall, and such that the cut line

extends at least partially through a cooling cavity defined between the first and second sidewalls . . . contouring the replacement blade portion such that the newly formed compressor rotor blade has a contour that substantially mirrors that of the original compressor rotor blade contour.

Neither Dulaney et al. nor Legros, considered alone or in combination, describe or suggest a method for replacing a damaged portion of a gas turbine engine damaged rotor blade as recited in Claim 15. Specifically, Neither Dulaney et al. nor Legros, considered alone or in combination, describe or suggest cutting through a portion of the damaged rotor blade such that a cut line extends from the leading edge to the trailing edge, and between the first sidewall and the second sidewall, and such that the cut line extends at least partially through a cooling cavity defined between the first and second sidewalls. Rather, in contrast to the invention, Dulaney et al. recite at column 9, lines 26-30, that the “preferred method for removing the damaged area and surrounding airfoil section, such as the section of the airfoil 10 surrounded by phantom lines 32 and 34 is by milling away the section of airfoil 10,” and Legros describes removing the rotor from the engine such that the blades may all be aligned relative to the rotor before any repairs to the blades are preformed. For the reasons set forth above, Claim 15 is submitted to be patentable over Dulaney et al. in view of Legros.

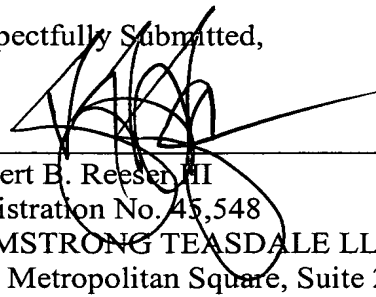
When the recitations of Claim 16 are considered in combination with the recitations of Claim 15, Applicants submit that dependent Claim 16 likewise is patentable over Dulaney et al. in view of Legros.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 4, 10, and 16 be withdrawn.

For at least the reasons set forth above, Applicants respectfully request that the rejections of Claims 4, 10, and 16 under 35 U.S.C. 103(a) be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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